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Formation of artificial plasma disturbances in the lower ionosphere

Bakhmet'eva N., Frolov V., Vyakhirev V., Kalinina E., Bolotin I., Akchurin A., Zykov E.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

We present the results of experiments on sounding the disturbed ionospheric region produced by the high-power RF radiation of the "Sura" heating facility, which were performed simultaneously at two observation points. One point is located on the territory of the heating facility the other, and the other, at the observatory of Kazan State University (the "Observatory" point) in 170 km to the East from the facility. The experiments were aimed at studying the mechanism of formation of artificial disturbances in the lower ionosphere in the case of reflection of a high-power wave in the F region and determining the parameters of the signals of backscattering from artificial electron density irregularities which are formed as a result of ionospheric perturbations. The ionosphere was modified by a high-power RF O-mode wave, which was emitted by the transmitters of the "Sura" facility, in sessions several seconds or minutes long. The disturbed region was sounded using the vertical-sounding technique at the "Vasil'sursk" laboratory by the partialreflection facility at a frequency of 2.95 MHz, and by the modified ionospheric station "Tsiklon" at ten frequencies ranged from 2 to 6.5 MHz at the "Observatory" point. At the same time, vertical-sounding ionograms were recorded in the usual regime. At the reception points, simultaneous changes in the amplitudes of the vertical-sounding signals and the aspect backscattering signals were recorded. These records correlate with the periods of operation of the heating facility. The characteristics and dynamics of the signals are discussed.

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